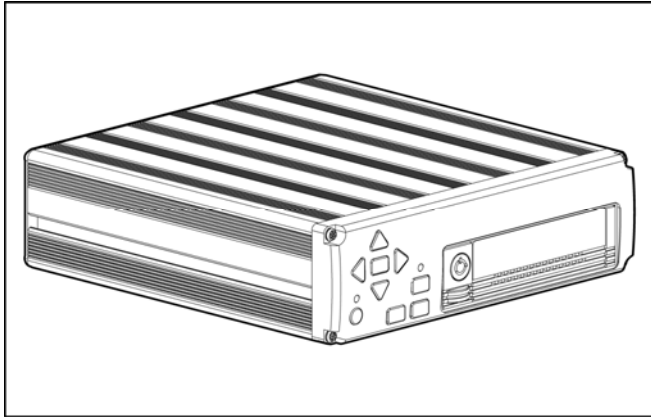# SAFETY VISION®

**Safety Vision RouteRecorder® 4C
Mobile Digital Video Recorder System
Installation Guide**

## Overview

The Safety Vision RouteRecorder® 4C Mobile Digital Video Recorder with Removable Hard Drive is designed for mobile digital video recording in rugged automotive conditions and can be used to upgrade obsolete analog technology in existing mobile VCR observation systems. The 2.5-inch removable MDVR hard drive stores files in standard PC file format that can be viewed and archived via a PC connected to a hard drive reader. Programming options and on-screen display settings can be defined by the user to meet individual requirements.

The RouteRecorder® 4C Mobile Digital Video Recorder (MDVR) records meta-data in addition to each individual video frame. Meta-data includes system information such as the date and time and the status of user-defined input triggers.

Optional peripheral components such as cameras, monitors, and microphones are available separately.

The main features of the RouteRecorder® 4C system are:

- MDVR, which features both manual event recording and automatic input trigger recording for 7 input triggers, plus a vehicle ignition trigger that automatically powers up the RouteRecorder® 4C system

- 2.5-inch removable hard drive that stores recorded data in standard PC file format.

- Embedded software that:

    - Authenticates the integrity of archived video files

    - Automatically calculates remaining recording capacity

    - Logs input trigger and event data along with recorded image frames in data files

- Allows on-screen programming for user-selectable items such as video resolution and frame rate (on-screen programming requires a monitor, which is not provided)

- 4 camera inputs

## Supplied and Optional Hardware

Two access door lock keys are provided with each RouteRecorder® 4C.

Each MDVR requires a removable hard drive. Removable hard drives of various sizes are available.

Optional installation hardware kits are available for surface-mount, flush-mount, and console installations. A hard drive reader (for connecting the hard drive to a desktop or notebook PC) is available as an option. In addition, optional peripheral components such as cameras, monitors, and microphones, are available.

## System Components

Components of the RouteRecorder® 4C system are as follows:

### MDVR
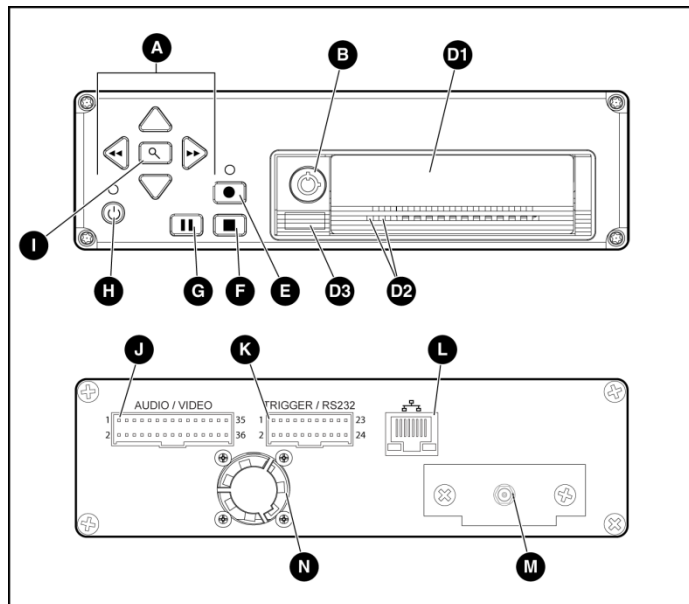


↑ MDVR (Part Number SV-4CHDDVR)

**A    DIRECTIONAL BUTTONS**—have the following functions, depending on the current mode:
- When video is being played back at normal speed (1X):
  - **UP**—cycles up from Channel 1 through Channel 4 and the quad view for audio/video output
  - **DOWN**— cycles down from Channel 4 through Channel 1 and the quad view for audio/video output
  - **LEFT**—adjusts fast-reverse video playback speed to a maximum of 90X
  - **RIGHT**—adjusts fast-forward video playback speed to a maximum of 90X
- When playback video is paused:
  - **LEFT**—reverses video playback one frame at a time
  - **RIGHT**—advances video playback one frame at a time
- When video is not being played back, these buttons move the cursor through on-screen menu selections, and the **RIGHT** button functions as an **ENTER** key by confirming menu selections.
- When the DVR is in Record or Standby mode, the UP and DOWN directional buttons are used to cycle input between Channel 1 through Channel 4 and the quad view

**B    ACCESS DOOR LOCK**—allows key access to the hard drive slot

**D1  RHD SLOT**—accepts a removable hard drive (RHD) that stores recorded audio/video files

**D2  DATA/POWER LEDs**—yellow LED (on the left) lights when data is being written to the removable hard drive; green LED (on the right) lights when the removable hard drive is powered on.

**D3  EJECT BUTTON**—ejects the removable hard drive

**E    RECORD BUTTON**—starts manual recording

**F    STOP BUTTON**—stops playback video and resumes the live view

*CAUTION: To prevent corruption of the hard drive, press the STOP button BEFORE removing the hard drive.*

**G    PAUSE BUTTON**—pauses playback video (or resumes paused video playback)

**H    POWER BUTTON**—has the following functions:
- When pressed and released, manually powers the MDVR ON or OFF

*NOTE: In typical installations, the MDVR is powered ON and OFF automatically by the vehicle-ignition sensor. When it has been powered ON manually, the MDVR remains ON until the POWER button is pressed again.*

*When the MDVR is already ON because it has been triggered by a sensor and recording, the POWER button is disabled.*

**I    SEARCH/MENU BUTTON**—when pressed and released, initiates display of the Search menu for audio/video files stored on the hard drive; when pressed and held for 3 seconds, initiates display of the Main menu

**J    AUDIO/VIDEO INPUT**—accepts the SV-4CTHRNS wiring harness

**K    TRIGGER INPUT**—accepts the SV-4CSENHRNS wiring harness

**L    ETHERNET PORT**—accepts the RJ45 connector of an optional Ethernet cable; can be used to download files through a wired or wireless Ethernet connection

**M    GPS RECEPTACLE**— *(optional)* accepts the connector for the GPS module

**N    FAN**—cools the MDVR by maintaining air flow

## Important Installation Precautions

Keep the following precautions in mind when installing the RouteRecorder® 4C system:

- **IMPORTANT:** To reduce the risk of electrical shock, disconnect the vehicle negative battery terminal during RouteRecorder® 4C system installation.

- To prevent system damage, the main wiring harness (Part Number SV-4CSENHRNS) must not be connected to the vehicle electrical system until all other components and cables are installed and connected.

- The ground wire of the main wiring harness (Part Number SV-4CTHRNS) must be connected directly to the vehicle chassis.

- Use care when affixing any device to a vehicle with screws. Before drilling or inserting screws, ensure that vehicle components such as the gas tank and airbags will not be damaged by the drill bit or screw.

- To prevent system damage, use only the cables supplied with the RouteRecorder® 4C system.

- Do not disassemble any component of the RouteRecorder® 4C system.

## Typical Installation

1. Select an appropriate mounting location for the MDVR.

2. Refer to the following illustrations for:
    - Surface-mount installation
    - Flush-mount installation
    - Installation using the VCR Lockbox Adapter Bracket
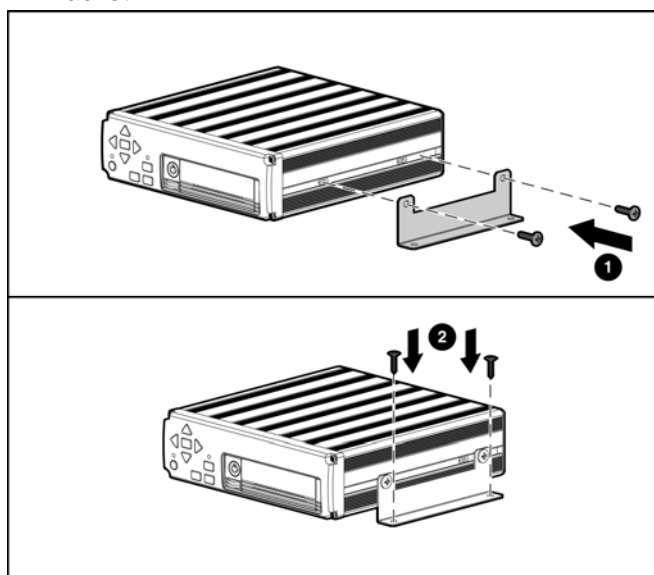


**↑ Surface-Mount Installation**
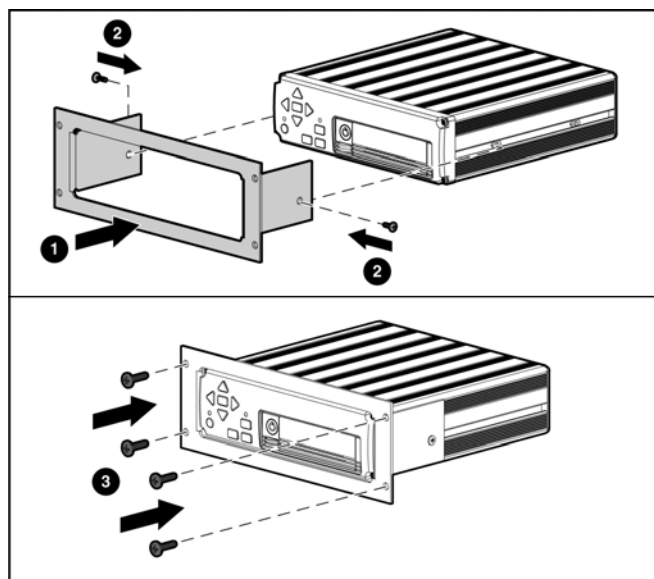


**↑ Flush-Mount Installation**
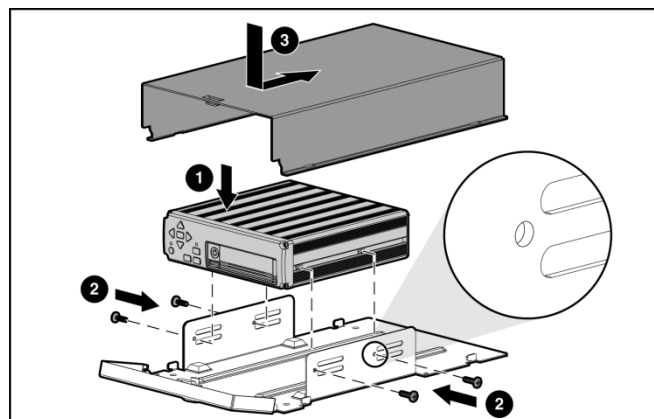


**↑ SV-DVR-LB2 Installation**

*NOTE: When mounting the RouteRecorder 4C unit in the SV-DVR-LB2 lockbox as shown above, use the holes provided in order to ensure access to the hard drive.*

*When mounting the RouteRecorder 4C "upside down" in the SV-DVR-LB2 lockbox, use the slots provided and adjust the unit's position accordingly.*

3. Connect system and peripheral devices to the MDVR as directed in documentation for the devices.

### Connecting Components

When connecting components, select inconspicuous cable routes that do not interfere with driver or passenger mobility and that prevent damage to the cables

Refer to Appendix A for illustrations of typical system wiring and component connections of the main wiring harness (Part Number SV-4CTHRNS).

■ **Main Wiring Harness Connection to MDVR**

Pin configuration for the 36-pin connector of the MDVR main wiring harness is as follows:
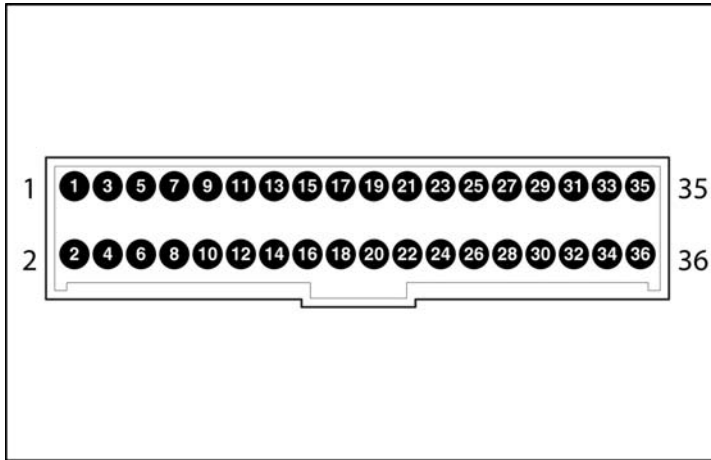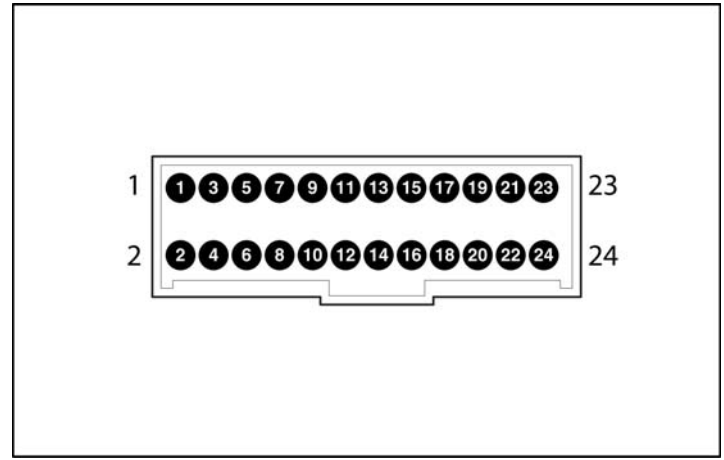
| Pin | Pin Function |
|-----|--------------|
| 1 | Ground |
| 3 | Ground |
| 5 | Ground |
| 7 | Ground |
| 9 | Ground |
| 11 | Ground |
| 13 | Ground |
| 15 | Ground |
| 17 | Ground |
| 19 | Ground |
| 21 | Ground |
| 23 | Ground |
| 25 | -12V Camera 1 |
| 27 | -12V Camera 2 |
| 29 | -12V Camera 3 |
| 31 | -12V Camera 4 |
| 33 | Main Power (-) |
| 35 | Main Power (-) |

| Pin | Pin Function |
|-----|--------------|
| 2 | Left Audio Out |
| 4 | Right Audio Out |
| 6 | Video Out |
| 8 | Ignition |
| 10 | Audio In 1 |
| 12 | Video In 1 |
| 14 | Audio In 2 |
| 16 | Video In 2 |
| 18 | Audio In 3 |
| 20 | Video In 3 |
| 22 | Audio In 4 |
| 24 | Video In 4 |
| 26 | +12V Camera 1 |
| 28 | +12V Camera 2 |
| 30 | +12V Camera 3 |
| 32 | +12V Camera 4 |
| 34 | Main Power (+) |
| 36 | Main Power (+) |

■ **Sensor Wire Harness Connection to MDVR**

Pin configuration for the 24-pin connector of the MDVR sensor wire harness is as follows:

| Pin | Pin Function |
|-----|--------------|
| 1 | Ground |
| 3 | Ground |
| 5 | Not used |
| 7 | Not used |
| 9 | Ground |
| 11 | Serial 1 Transmit |
| 13 | Serial 1 Receive |
| 15 | Ground |
| 17 | Serial 2 Transmit |
| 19 | Serial 2 Receive |
| 21 | Ground |
| 23 | Ignition Input Indication |

| Pin | Pin Function |
|-----|--------------|
| 2 | Trigger 1 |
| 4 | Trigger 2 |
| 6 | Trigger 3 |
| 8 | Trigger 4 |
| 10 | Trigger 5 |
| 12 | Trigger 6 |
| 14 | Trigger 7 |
| 16 | GP output 1* |
| 18 | GP output 2* |
| 20 | 12V out (current limited) |
| 22 | Ground |
| 24 | Not used |

*NOTE:*   *See Comments section in System Setup Menu section.*

## Initial Setup

To manually input setup options, an optional monitor must be connected.  See associated monitor documentation for details on connecting a monitor.

To initiate display of the Main menu, press and hold the 🔍 **SEARCH/MENU** button on the front panel of the MDVR for 3 seconds.

Use the **UP** and **DOWN** buttons to move the cursor through on-screen menu selections.  Use the ▷ **RIGHT** directional button as the "Enter" key.

When you have finished setting up a menu item, press the 🔍 **SEARCH/MENU** button again to save the changes.

*NOTE:*  *After several minutes of inactivity, the menu is no longer displayed, and the 🔍 SEARCH/MENU button must be pressed again to initiate display of the main menu again.*

## Main Menu

The main menu includes the following menus:

- System Setup
- Title Setup
- Trigger Setup
- Communication (Comm.) Setup
- Camera 1-4 Setup
- GPS Setup
- System Info

***For detailed information about these menus, refer to Appendix B.***

## Typical Installation Settings

These settings are valid for most typical RouteRecorder® 4C installations:

- System Setup Menu
  - OSD: ENABLE
  - Record Mode: STOP
  - Units: ENGLISH
  - GP Out 1 Mode: RECORD
  - GP Out 2 Mode: RECORD
  - Time Setup: Default value for Daylight Saving Time is ON
  - Password Setup: Default value for Password is **123456**; default value for the password requirement is DISABLED for all 4 levels of operation.

- Title Setup Menu
  - System Name: Safety Vision 4C
  - Triggers 1 through 7: User specified
- Trigger Setup Menu
  - T1: DISPLAY, HIGH
  - T2: DISPLAY, HIGH
  - T3: DISPLAY, HIGH
  - T4: DISPLAY, HIGH
  - T5: DISPLAY, HIGH
  - T6: MARK EVENT, HIGH
  - T7: DISPLAY, LOW
  - Ignition Setup:
    - Record Control: ENABLE
    - Record Start Delay: 0 MIN
    - Record Stop Delay: 5 MIN
    - Power Off Delay: 1 MIN
- Communication Setup
  - Comm. 1 and 2 Setup
    - Baud Rate: 9600
    - Parity: none
    - Data Bits: 8
    - Stop Bits: 1
    - Protocol: VISCA
    - One Touch Zoom: 75 PCT
    - Focus: AUTO
    - Sensitivity: LOW
    - Slow Shutter: OFF
- Camera 1-4 Setup Menu
  - Frame Rate: 30 fps
  - Image Size: QVGA
  - Image Quality: MEDIUM
  - Audio: ON
  - Audio Volume: 6dB
- GPS Setup Menu
  - Use GPS: YES
  - Use GPS Time: YES
  - UTC/Local Time: -6
  - GPS Data Format: DDD:HH:SS

## Basic Operation

The RouteRecorder® 4C system is initially configured to power up and record automatically when the vehicle ignition is on.  When configured for event-based recording, it is not necessary for the driver to turn the system on or to manually initiate or stop recording.  However, a user can start and stop a recording manually and can control the system as follows:

### Manual MDVR Recording

To start a recording manually, press the ◉ **RECORD** button on the front panel of the MDVR.  To stop, press the **STOP** button.

### Switching Audio/Video Input

When the DVR is in Record or Standby mode, use the UP and DOWN directional buttons on the front panel of the MDVR to switch input between Channel 1, 2, 3, 4, or the Quad View.

### MDVR Recording Capacity

The recording capacity of the MDVR depends on the following user-selectable factors:

- Frame rate (30 fps to 1 fps)
- Image quality (high, medium high, medium, medium low, or low)
- Image resolution (720 x480, 640 x480, 360 x 240, or 320 x240 pixels)
- Storage capacity of the hard drive

### Marking an Event with the Event Button

An event can be marked manually with the optional Event Button (SV-MDVR-EB-HRNS).

Press the button once to mark an event.  When the files are viewed at a later date, file names with a marked event appear with a pound sign (#).

---

*NOTE:*   *See the MDVR File Format section on more information on file names.*

*The Event Button must be connected to a Trigger wire, and that trigger must be configured to mark an event.  See Appendix A: Typical System Wiring and Appendix B: Setup Menus for me information.*

---

## Searching For and Playing Back Video

The MDVR can be used to control playback when an optional monitor is installed.  See associated monitor documentation for details on connecting a monitor.

◉  To search for and play back video, press and release the 🔍 **SEARCH/MENU** button to display the Video Search screen on the system monitor, as follows:



**Left column**    displays the dates for which video files have been recorded

**Right column**  displays the starting time for each video file recorded on the date selected

◉  Use the directional buttons on the front panel of the MDVR to select the date in COLUMN A and the appropriate starting time in COLUMN B. Press the ▷ **RIGHT** button to play the selected video file.

◉  During playback, use the MDVR directional buttons as follows:

- ◁ **LEFT** button adjusts fast-reverse speed to a maximum of 90X.
- ▷ **RIGHT** button adjusts fast-forward speed to a maximum of 90X.
- **UP** and **DOWN** buttons select Channel 1, 2, 3, 4, or the Quad View for audio/video output (only when video is being played back at normal speed [1X])

## Archiving Video to a PC

WARNING:  *To prevent hard drive damage and loss of data stored on the removable hard drive, DO NOT use the Microsoft Windows operating system of the PC to format the removable hard drive.*

*Use of the Windows operating system FORMAT command on the removable hard drive will erase all data stored on the removable hard drive and make the removable hard drive unusable in the MDVR.*

*Furthermore, on some PCs, the operating system may not automatically recognize the removable hard drive, in which case the operating system will prompt the user about whether the unrecognized drive should be formatted. If appropriate, click the NO button in response to the following prompt:*

> **THE DISK IN DRIVE X IS NOT FORMATTED. DO YOU WANT TO FORMAT IT NOW?**

◉  Connect the storage media to the PC, as follows:

First connect the optional hard drive reader (Part Number SV-HDREADER) to a USB port on the PC. Next, plug the AC adapter into the hard drive reader. Then, insert the removable hard drive that contains recorded RouteRecorder® 4C system files into the hard drive reader, and turn on the key of the hard drive reader.

The storage media (the removable hard drive) will be recognized by the Microsoft Windows Operating System of the PC and assigned a drive letter in Microsoft Windows Explorer, which can be used to copy video files from the storage media to the PC.

## MDVR File Format

The MDVR stores recorded audio/video files on the installed archive media (the removable hard drive) in standard PC file format. The MDVR saves each 10-minute segment in a separate file and automatically assigns a filename that identifies the source MDVR and the starting date and time of the segment. In addition, the filename identifies "continuation" files (files that are a continuation of another 10-minute segment) and "event" files (files that include a user-defined event such as activation of the vehicle backup lights).

Sample MDVR file names:

| | |
|---|---|
| Mar.12.2008-17.36.48-001.avi | Record button manually pressed |
| Mar.12.2008-17.36.48#-002.avi | Trigger event occurred |
| Mar.12.2008-17.36.48#-003.avi | Another event occurred |
| Mar.12.2008-17.36.48-004.avi | No event occurred, DVR created next file in sequence automatically |

## Removing the Hard Drive from the MDVR

*CAUTION: To prevent corruption of the hard drive, press the **STOP** button on the front panel of the MDVR panel BEFORE removing the hard drive.*

◉  Press the **STOP** button on the front panel

◉  Use one of the provided keys to unlock the access door lock on the front panel of the MDVR.

◉  Press the EJECT button to eject the removable hard drive.

## Meta-Data

The MDVR generates system information (meta-data) for each image frame and stores it on the archive media (the removable hard drive). The meta-data describes conditions (such as the date, time, and status of input triggers) present at the time of recording.

## On-Screen Display

When recorded video is being played back or live video is being displayed on the optional monitor, meta-data is displayed on-screen as follows:



A  **TIME**—displays the time in HH:MM:SS format (the time is set by the user during initial setup and then maintained by the MDVR)

B  **MDVR STATUS**—displays the current mode of the MDVR (Stop, Record, Playback [and Playback Speed], or Pause)

C  **CURRENT INPUT**—displays CH1-CH4 (channel 1-4), no display for the Quad View

D  **ACTIVE TRIGGER**—displays the trigger that started recording activity

E  **DATE**—displays the date in MM/DD/YY format (the date is set by the user during initial setup and then maintained by the MDVR)

F  **ACCELEROMETER** and **RADAR SPEED**

G  **GPS COORDINATES**

H  **MDVR NAME**—displays the user-definable MDVR name

## Remote MDVR Access Through FTP

The MDVR supports FTP commands in MS-DOS as follows:

- Cd (changes directory)
- Dir (displays a directory listing)
- Ls (lists the contents of the directory)
- Get (gets a file from the MDVR)
- Delete (deletes a file from the MDVR)
- Rmdir (removes a directory from the MDVR)

*WARNING:   Use the **Rmdir** command with caution. The MDVR does not verify that a directory is empty before allowing the directory to be deleted. In addition, using the **Rmdir** command to delete a directory that is not empty causes space on the removable hard drive to become unavailable for use.*

## System Health Logs

Log files are created and placed in the hard drive's SYSTEM\SYSLOG folder.  To prevent a file system error from corrupting all log files, the logging system will fill 10 files in rotation with the oldest file deleted when necessary.  A new file is created if the file reaches 512 records, a new day, or the system is turned off and on again.  Each file has a date stamp in the filename and can be viewed in date order.  See Appendix C: System Health Logs for more information.

## Specifications

**MDVR Specifications**
Part Number SV-4CHDDVR

| Item | Specification |
|---|---|
| Power Supply Input Rating | 8 ~ 24 VDC (standard automotive power range) |
| Power Consumption | *When ON:* < 470 mA (without cameras) *When OFF:* < 10 mA |
| Video System | NTSC |
| Video Compression | Motion JPEG compression (5 user-selectable compression ratios) |
| Video Resolution | User-selectable: 720 x480, 640 x480, 360 x 240, or 320 x240 |
| Frame Rate | User-selectable: 30 fps to 1/1 fps [time-lapse] |
| File Format | 8 channel AVI (4 video, 4 audio) (can be played with Microsoft Windows Media Player) |
| Archive Media Type | 2.5-inch hard drive |
| Typical Recording Time | 80-GB Hard Drive: 92 to 132 hours 120-GB Hard Drive: 130 to 200 hours |
| Operating Temperature | 41°F ~ 131°F (0°C ~ 55°C) |
| Dimensions Width x Depth x Height | 7 x 8 x 2 inches 178 x 203 x 51 mm |
| Weight | 4.5 lbs (2 kg) |
| External Trigger Inputs | 7 trigger inputs in addition to the vehicle ignition trigger input |
| Operating Vibration | Linear 5-300 Hz, 1.0G (0 to peak) |
| Transient Protection | 2500 watts for 10 m/s |
| Supplied Accessories | Access door lock keys (2) |

## Warranty Information

**LIMITED 1-YEAR NEW PRODUCT WARRANTY**

Safety Vision, L.P. ("SV") makes the following limited warranty, which is effective at the time of the original end-user purchase.

---

*NOTE:*  *Optional warranty products are available for all SV products and may be purchased at the time of the original end-user purchase or any time during the original Limited 1-Year New Product Warranty period.*

---

SV warrants this product against defects in materials for a period of 1 year after the date of purchase. During this period, SV will repair or replace a defective product or part without charge to the customer. The customer must send the defective product or part to SV or an authorized SV dealer. The customer must pay for all transportation and insurance charges for sending the unit to be repaired. SV's total liability is limited to the original product cost.

### ■ Installation Guide

The customer should thoroughly read this guide before operating this product.

### ■ Customer's Responsibility

The above warranty is subject to the following conditions:

- Customer must notify SV within 10 days of discovering the defective product or part and provide a description of the defect and complete information about the manner of its discovery.
- All warranty servicing of this product must be performed by SV or an authorized servicing agent.
- Warranty extends only to defects in materials as limited above. Warranty does not extend to any product or part that has been lost or discarded by the customer; to damage to products or parts caused by misuse, accident, improper installation, improper maintenance, or use in violation of instructions furnished with the product; to units that have been altered or modified without authorization of SV; to damage to products or parts thereof that have had the serial number removed, altered, defaced, or rendered illegible; or to any failure of the product to function caused by burglary, fire, flood, war, riot, civil commotion, Acts of God, or any other condition beyond the control of SV.

### ■ Obtaining Warranty Service

To obtain warranty service, the customer must contact the SV Service and Warranty Manager at 713.896.6600 or 800.880.8855 to report a defective product. (The customer must report the model number and serial number if available.) The Service and Warranty Manager will assist in troubleshooting the problem and, if necessary, issue a return material authorization (RMA) number.  The customer must include this number on the outside of each package shipped to SV.

### ■ Important Packing and Shipping Instructions

When a product requires service, only the affected component must be returned. The customer must use proper packing material to ensure against damage during shipping. Any shipping damage caused by improper packing is not covered under this warranty. In addition, the customer must include a return material authorization (RMA) number on the outside of each package shipped to SV and a letter explaining the defect with the product.

## How to Reach Us

If you have exhausted the information in this document and require further assistance or information, please contact Safety Vision toll-free at 1-800-880-8855 or send an e-mail message requesting assistance to: email@safetyvision.com.

## Document Change Log

| Document Version | Document Filename | Date | Changes Made |
|---|---|---|---|
| 1.0 | ROUTERECORDER 4C IG VER 1.0.DOC | July 2008 | New document |
| 1.2 | '' | Feb 09 | Updated to reflect changes in firmware |
| 1.3 | " | July 09 | Updated SV-DVR-LB2 diagram |

## ■ Appendix A: Typical System Wiring

The following wiring overview is appropriate for typical RouteRecorder® 4C system installations.
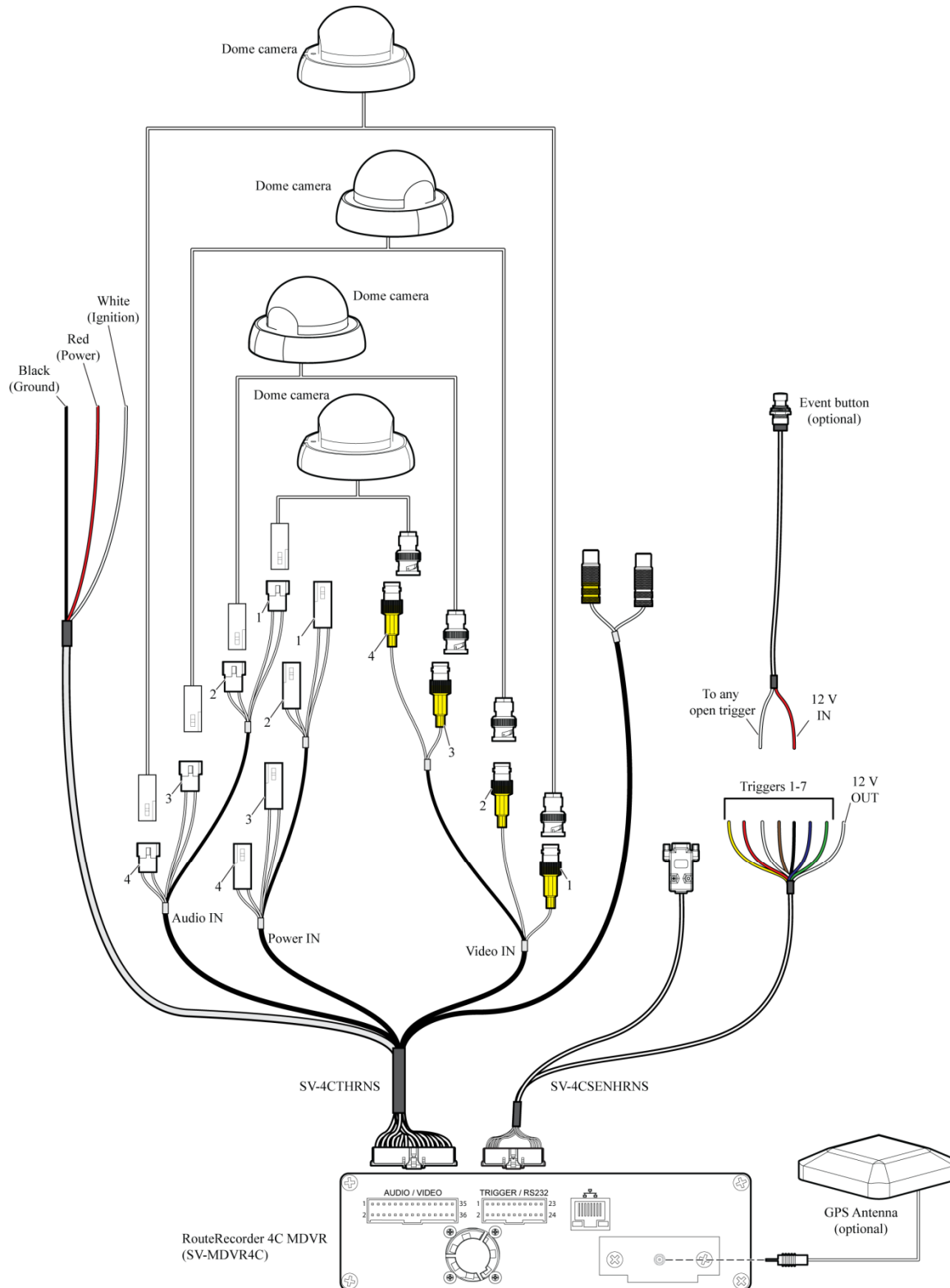


↑ Typical Wiring Overview

## ■ Appendix B: Setup Menus

The main menu includes the following menus:

- System Setup
- Title Setup
- Trigger Setup
- Communication (Comm.) Setup
- Camera 1-4 Setup
- GPS Setup
- System Info

### System Setup Menu

The System Setup menu allows user configuration as follows:

| Menu Item | Description | Comments |
|---|---|---|
| OSD | Turns the On Screen Display on or off | Values: ENABLE, DISABLE<br>Default: ENABLE |
| Record Mode | Selects continuous recording or trigger-based recording (Stop) | Values: CONTINUOUS, STOP<br>Default: STOP |
| Units | Controls the standard of measurement | Values: ENGLISH, METRIC<br>Default: ENGLISH |
| GP Out 1, 2 Mode | General purpose 12V outputs indicate a number of MDVR events (see Comments) | Values:<br>- POWER (unit powered on)<br>- RECORD (recording)<br>- PLAY (playing back footage)<br>- SPEED (speed exceeds limit set in GPS Setup Menu)<br>- ACCEL (acceleration exceeds limit set in GPS Setup Menu)<br>- T1-T7 (when HIGH state voltage is applied to indicated triggers)<br>- USER_CONTROL (trigger command made using telnet protocol)<br>- DISK_FULL (disk full, recording stopped)<br>- TRIGGER_ACTIVE (any trigger is activates)<br>Default for GP Out 1 Mode: RECORD<br>Default for GP Out  Mode: POWER |
| Time Setup | Displays the menu that controls the system date, time, timezone, Daylight Saving Time, and 12 or 24 hour formats | Default value for Daylight Saving Time is ON |
| File Setup | Displays the File Setup Menu that allows the user to define the maximum recorded file size by time and file size. | Menu items:<br>- Max File Time (10 minute default)<br>- Max File Size (1024 MB default) |

| Menu Item | Description | Comments |
|---|---|---|
| Password Setup | Allows user to set a password that is required when performing certain activities with the MDVR; password allows use of designated activity for 30 minutes or until power is cycled | The MDVR prompts for password input when it is powered up initially. The default password is **123456**. The password may contain any upper- or lowercase letters in addition to numbers and the symbols "-" and "@". <br><br>The requirement for a password can be enabled or disabled for 4 levels of operation as follows:<br> ▪ All Keys<br> ▪ Power-off<br> ▪ Playback<br> ▪ Menus |
| Advanced Setup | Initiates display of the Advanced Setup menu | Menu items:<br> ▪ Restore Defaults (restores factory default settings)<br> ▪ Disk to Erase (selects target for Erase Media and Format Media options)<br> ▪ Erase Media (Permanently deletes all recorded data except for the system directory<br> ▪ Format Media (Permanently deletes all recorded data and installs a DVR file system – use when "No Disk" error appears despite installed disk)<br> ▪ Network Setup (See following "Network Setup Sub-Menu" section.) |

■   **Network Setup Sub-Menu**

| Menu Item | Description | Comments |
|---|---|---|
| IP Address: | MDVR network address (requires power cycle to take effect) | User-selectable |
| Subnet Mask: | Used to determine the subnet to which MDVR IP address belongs (requires power cycle to take effect) | User-selectable |
| FTP Username | Case-sensitive user name used when connecting with a web browser | Default: **USER** |
| FTP Password | Case-sensitive password used when connecting with a web browser | Default: **PASS** |
| Save | Saves network setup information | N/A |

## Title Setup Menu

The Title Setup menu allows user naming of the MDVR and input triggers (for inclusion in meta-data and on-screen display) as follows:

| Menu Item | Description | Default |
|---|---|---|
| System Name | Allows user input of a 14-character alphanumeric MDVR name | MDVR3xx |
| Trigger 1 through Trigger 7 | Allows user input of a 4-character alphanumeric name for Triggers 1 through 7, respectively | N/A |

## Trigger Setup Menu

The Trigger Setup menu allows assigning an MDVR response and a voltage state ([ACTIVE] HIGH or [ACTIVE] LOW) for each of the user-defined triggers, as well as the GPS-detected speed and accelerometer thresholds on the X and Y axes.

*NOTE:The accelerometer and speed triggers are only available on units equipped with the GPS option.*

The mask associated with a trigger indicates which cameras are recorded when the trigger is active.  The mask indicates directly which cameras are recorded so a mask of "123" will record cameras 1, 2, and 3 and not 4.  Trigger masks are additive such that multiple trigger activations create an aggregate mask that is the logical *or* of all active masks.  Camera 1 must always be active, therefore all masks contain camera one.

For example, if two triggers are activated where trigger 1 has the mask "13" and trigger 2 has the mask "4", then cameras "1", "3", and "4" will all be recorded.

| MDVR Response | Description |
|---|---|
| DISPLAY | Indicates trigger activity in on-screen display and in meta-data |
| MARK | Starts a recording if the MDVR is not already recording and indicates an event in the filename |
| RECORD | Starts a recording when trigger is activated and stops it when trigger is no longer activated |
| START [RECORD] | Starts a recording when trigger is activated but does not stop the recording when trigger is no longer activated |
| STOP [RECORD] | Stops a recording when trigger is activated |

Default settings for all 7 input triggers are DISPLAY and HIGH.

■   **Ignition Setup Sub-Menu**

| Menu Item | Description | Comments |
|---|---|---|
| Record Control | Enables or disables the Record Start Delay, Record Stop Delay, and Power Off Delay functions | Values: ENABLE, DISABLE<br>Default: ENABLE |
| Record Start Delay | Delay time from when the ignition is turned ON to when the MDVR starts recording | Values: 0 MIN to 60 MIN<br>Default: 0 MIN |
| Record Stop Delay | Delay time from when the ignition is turned OFF to when the MDVR stops recording | Values: 0 MIN to 60 MIN<br>Default: 0 MIN |
| Power Off Delay | Delay time from when ignition is turned OFF and recording stopped and the MDVR powers off. | Values: -1 MIN to 60 MIN (see Caution)<br>Default: 10 MIN |
| Camera Select | Mask of cameras to record on ignition | Values: Any combination of cameras 1-4, must always include Camera 1<br>Default: 1234 |

*CAUTION: Setting the Power Off Delay value to '-1' keeps the MDVR on indefinitely until power is removed.  This will run down a vehicle's battery.*

■   **Speed/Accel. Setup Sub-Menu**

| Menu Item | Description | Comments |
|---|---|---|
| Speed | GPS-detected speed at which recording begins | Values: ENABLE, DISABLE<br>Default: 52 MPH |
| Speed Dwell | Time for which recording lasts once Speed (as set in the previous item) has been surpassed | Values: 0 MIN to 60 MIN<br>Default: 5 MIN |
| Accel. X | Amount of G (gravitational force) detected by the accelerometer on the X axis (side-to-side) | Values: 1.0 to 10.9 G<br>Default: 1.0 G<br>(see Note) |
| Accel. Y | Amount of G (gravitational force) detected by the accelerometer on the Y axis (backwards and forwards) | Values: 1.0 to 10.9 G<br>Default: 1.0 G<br>(see Note) |
| Accel. Dwell | Time for which recording lasts once Accel. X or Y (as set in the previous items) has been surpassed | Values: 0 MIN to 60 MIN<br>Default: 5 MIN |

*NOTE: The accelerometer values are absolute.  A setting of 5.0 G will trigger an event when both 5.0 G and -5.0 G is reached.*

## Communication (Comm.) Setup Menu

The Communication (Comm.) Setup menu allows user configuration of Comm. 1 and Comm. 2 as follows:

| Menu Item | Description | Comments |
|---|---|---|
| Baud Rate | Selects the baud transfer rate | Values: 4800, 9600, 38400<br>Default: 9600 |
| Parity | Selects none, even, or odd parity | Values: none, even, odd<br>Default: none |
| Data Bits | Selects number of data bits | Values: 5, 6, 7, 8, 9<br>Default: 8 |
| Stop Bits | Selects number of stop bits | Values: 1, 2<br>Default: 1 |
| Protocol | Selects the protocol to be used with zoom cameras; Note that Safety Vision supplies a Sony forward-facing camera | Values: NONE, VISCA (Sony), COSTAR<br>Default: COSTAR |
| One Touch Zoom* | Selects the percentage of zoom applied | Values:<br>Default: 100 PCT |
| Focus** | Selects infinite or automatic focus | Values: AUTO, INFINITY<br>Default: AUTO |
| Sensitivity** | Selects how sensitive the camera is to light | Values: HIGH, LOW<br>Default: LOW |
| Slow Shutter** | Turns the slow shutter feature on or off | Values: ON, OFF<br>Default: OFF |

* This option only appears when VISCA or COSTAR is selected as the Protocol.
** These options only appear when VISCA is selected as the Protocol.

## Camera 1-4 Setup Menu

The Camera 1-4 Setup menu displays camera setup information as follows:

| Menu Item | Description | Comments |
| --- | --- | --- |
| Camera State | Enables camera to be recorded (Camera 1 is always enabled) | Values: ENABLED, DISABLED<br>Default: ENABLED |
| Frame Rate | Adjusts the frame rate of the selected camera in frames per second | Values: DISABLED, 1, 5, 7.5 10, 15, 30, CUSTOM*<br>Default: 30 fps |
| Image Size | Selects the image resolution of the selected camera | Values: D1 (720 x 480), VGA (640 x 480), QD1 (360 x 204), QVGA (320 x 240)<br>Default: QVGA |
| Image Quality | Adjusts the compression rate of the selected camera; Lower image quality equates to increased record times and vice versa | Values: HIGH, MEDIUM HIGH, MEDIUM, MEDIUM LOW, LOW, CUSTOM*<br>Default: MEDIUM |
| Audio | Selects if audio is recorded | Values: ON, OFF<br>Default: ON |
| Audio Volume | Adjusts the volume at which audio is recorded in decibels (dB) | Values: 0db, 3db, 6db, 9db, 12db, -12db, -9db, -6db, -3db<br>Default: 12db |

* CUSTOM is set via telnet command

## GPS Setup Menu

The GPS Setup menu displays system information as follows:

| Menu Item | Description | Comments |
| --- | --- | --- |
| Use GPS | Specifies whether the DVR records GPS information | Values: Yes or No<br>Default: Yes |
| Use GPS Time | Specifies whether the DVR time is set automatically by GPS module | Values: Yes or No<br>Default: Yes |
| GPS Data Format | Selects the on-screen display format for GPS information | Values:<br>▪ DDD:MM:SS (degrees: minutes: seconds)<br>▪ DDD:MM:mm (degrees: minutes: decimal minutes)<br>▪ DDD.ddddd (degrees: decimal degrees) |
| Calibrate Accel | Resets accelerometers to 0 Gs at the current mounted orientation | N/A |

## System Info Menu

The System Info menu displays system information as follows:

| Menu Item | Description |
| --- | --- |
| Disk Size | Storage capacity of the removable hard drive |
| Pct (Percent) Used | Percentage of used space on the removable hard drive |
| Pct (Percent) Free | Percentage of free space on the removable hard drive |
| Version | Firmware version level |
| Mac Address | MAC (media access control) address of the DVR |

## ■ Appendix C: System Health Logs

Each health log displays the date in MM.DD.YY format, the time in 24-hour format, the IP address of the MDVR, and the log name, in that order.  The following table lists all log names and the information that appears after them.

| Log Name | Meaning | Parameter reported |
|---|---|---|
| SYSTEM INFORMATION | System operating normal | p1: Degrees Celsius of processor<br>p2: Input voltage in millivolts |
| SYSTEM UNDER VOLTAGE | Low input voltage going below 9v threshold and when it comes above 10v | p1: Not used<br>p2: Voltage value causing error |
| CAMERA INPUT ERROR | Video signal not present on channel | p1: Camera ID<br>p2: Not used |
| Trigger Name | User configured trigger name is reported at each state change | NONE USED |
| ACCX | Acceleration trigger activated | p1: Not used<br>p2: Acceleration value x1000 |
| ACCY | Acceleration trigger activated | p1: Not used<br>p2: Acceleration value x1000 |
| SPD | Speed trigger set | p1: Not used<br>p2: Speed value |
| POWER ON START | Unit has booted | None |
| IGN | Ignition trigger state | None |
| MEDIA_READ_ERROR | Reading from media storage device failed | None |
| MEDIA_WRITE_ERROR | Writing to media storage device failed | None |

### ■ Appendix D: MDVR Dimensions